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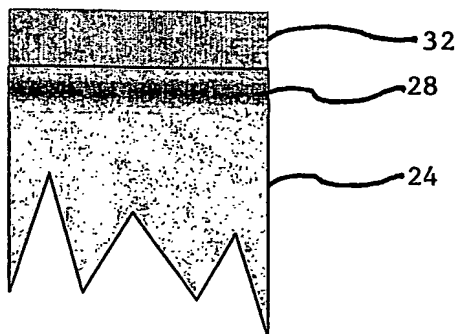
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(54) Title: FORMATION OF HIGHLY DISLOCATION FREE COMPOUND SEMICONDUCTOR ON A LATTICE MISMATCHED SUBSTRATE



(57) Abstract: A highly dislocation free compound semiconductor, e.g. $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$ ($0 < x, y < 1$), is formed on a lattice mismatched substrate, 24 e.g. Si, by first depositing a polycrystalline buffer layer 22 on the substrate. An amorphous layer 28 is then created at the interface of the substrate and the polycrystalline buffer layer, e.g. through ion implantation. A monocrystalline template layer 30 of the compound semiconductor is then deposited on the buffer layer, and an epilayer 32 of the compound semiconductor is grown on the template layer. A compound semiconductor based device structure may be formed in the epilayer.